

FIG. 1

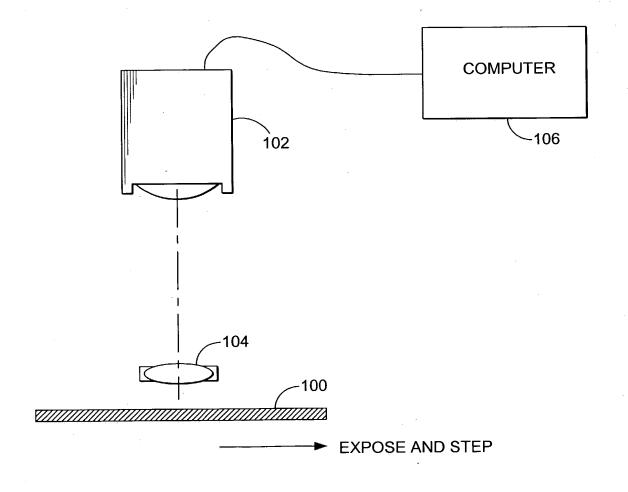


FIG. 4

# OBTAIN OR CRÉATÉ ORIGINAL FIG. 2 DIGITAL SIGNAL OR IMAGE **ESTIMATE ROUGH OFFSET** AND RMS NOISE CHOOSE N OR N-BIT IDENTIFICATION WORD, E.G. 32 **GENERATE N-BIT IDENTIFICATION WORD** GENERATE OR SYNTHESIZE N "RANDOM" INDEPENDENT SIGNALS WITH ROUGHLY GAUSSIAN DISTRIBUTION ABOUT SOME MEAN VALUE, WHERE SIGNALS HAVE EQUAL EXTENT AND DIGITAL SPACING OF ORIGINAL DIGITAL SIGNAL OR IMAGE APPLY DIGITAL FILTER WHICH ATTENUATES BOTH LOW AND HIGH FREQUENCIES, LEAVING MIDDLE-RANGE FREQUENCIES LARGELY INTACT CONDENSE N RANDOM SIGNALS TO A LOWEST ACCEPTABLE BIT VALUE IF MEMORY OR STORAGE SPACE IS AT A PREMIUM ADD ALL RANDOM IMAGES TOGETHER WHICH HAVE A CORRESPONDING "1"

IN THEIR ASSOCIATED BIT-PLACE-VALUE OF THE N-BIT IDENTIFICATION WORD. CALL THIS THE BASE COMPOSITE SIGNAL OR IMAGE

EXPERIMENT VISUALLY WITH GAIN AND GAMMA APPLIED TO BASE COMPOSITE SIGNAL OR IMAGE, ADDING THIS TO ORIGINAL DIGITAL SIGNAL OR IMAGE, AND DETERMINING THE ACCEPTABLE PERCEIVED NOISE LEVEL

APPLY FOUND GAIN AND CAMMA TO BASE COMPOSITE, ADD TO ORIGINAL, THEN CALL THIS THE DISTRIBUTABLE SIGNAL OR IMAGE

STORE AWAY AND SECURE ORIGINAL SIGNAL OR IMAGE, ALONG WITH N-BIT. IDENTIFICATION WORD AND THEN RANDOM SIGNALS

SELL OR DISTRIBUTE THE DISTRIBUTABLE SIGNAL OR IMAGE

OBTAIN DIGITAL OR NON-DIGITAL COPY OF SUSPECT SIGNAL OR IMAGE

### FIG. 3

DIGITIZE IF NOT ALREADY DIGITAL

CUT AND MASK PORTION OF SIGNAL OR IMAGE BELIEVED TO BE SUSPECT (ONLY IF ENTIRE SIGNAL OR IMAGE IS NOT SUSPECT)

PROCURE ORIGINAL DIGITAL SIGNAL OR IMAGE AND CUT AND MASK TO ROUGHLY THE SAME LOCATION OR SEQUENCE

VISUALLY RESCALE AND REGISTER THE CUT-OUT SUSPECT SIGNAL TO THE CUT-OUT ORIGINAL SIGNAL

RUN THROUGH SEARCH PROGRAM WITH MEAN SQUARED ERROR AS CRITERIA AND X OFFSET, Y OFFSET, AND SCALE AS THE THREE VARIABLES

APPLY X OFFSET, Y OFFSET, AND SCALE TO CUT-OUT SUSPECT, THEN RESAMPLE ONTO EXACT GRID AND CUT-OUT OF ORIGINAL SIGNAL

RUN THROUGH SEARCH PROGRAM WITH MEAN SQUARED ERROR AS CRITERIA AND DC OFFSET, GAIN, AND GAMMA AS THE THREE VARIABLES; APPLY TO SUSPECT

> SUBTRACT ORIGINAL FROM SUSPECT, GIVING DIFFERENCE SIGNAL OR IMAGE

STEP THROUGH ALL N RANDOM INDEPENDENT SIGNALS, MASKED AS ORIGINAL AND CROSS-CORRELATED WITH DIFFERENCE SIGNAL IN IMMEDIATE NEIGHBORHOOD OF REGISTRATION POINTS

FIND 0 AND 1 LEVEL BY AVERAGING FIRST FOUR 0101 CODE VALUES

ASSIGN EITHER A 0 OR A 1 TO EACH CROSS-CORRELATION RESULT DEPENDING ON PROXIMITY TO THE AVERAGES OF PREVIOUS STEP

CHECK RESULT AGAINST SECURED IDENTIFICATION NUMBER

PROSECUTE IF IT MATCHES? OR AT LEAST SEND A NASTY LETTER DEMANDING RECOMPENSE

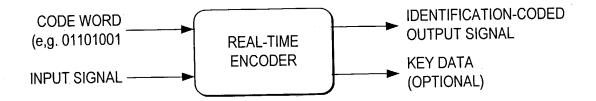


FIG. 5

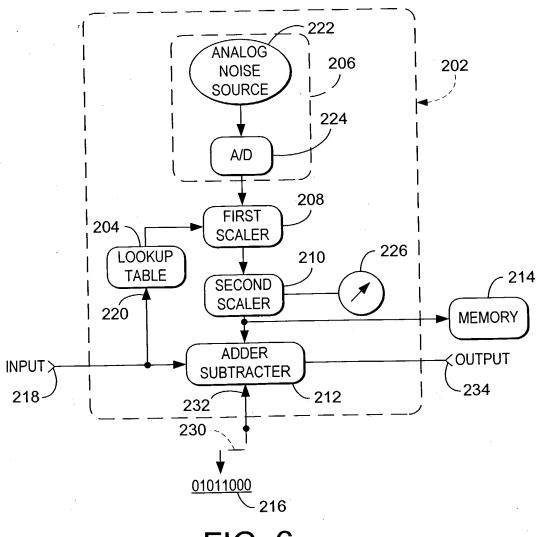
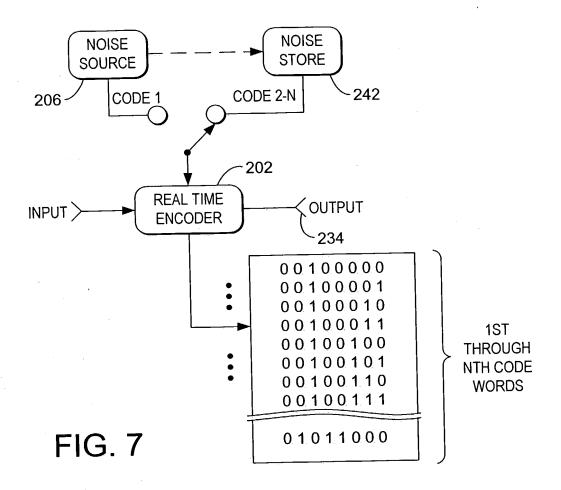


FIG. 6



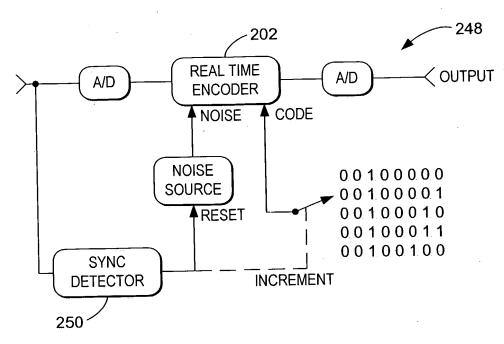
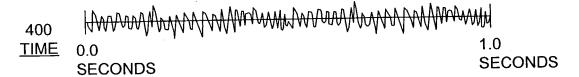
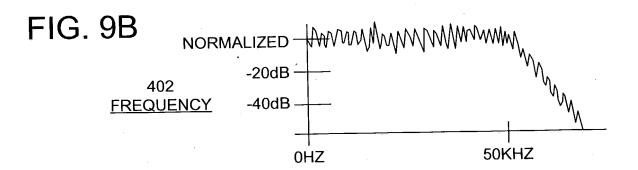


FIG. 8

## FIG. 9A





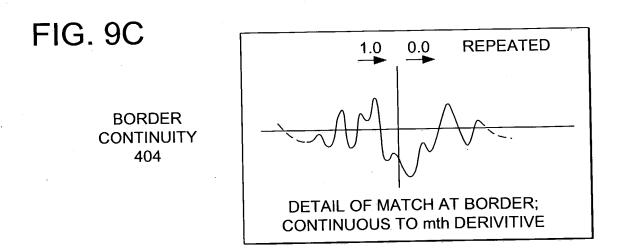
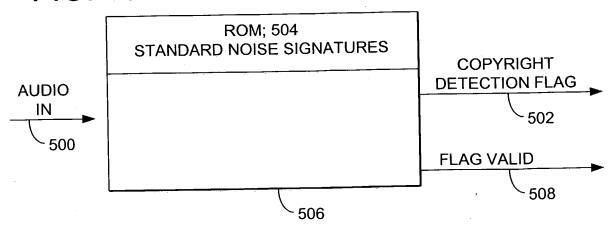
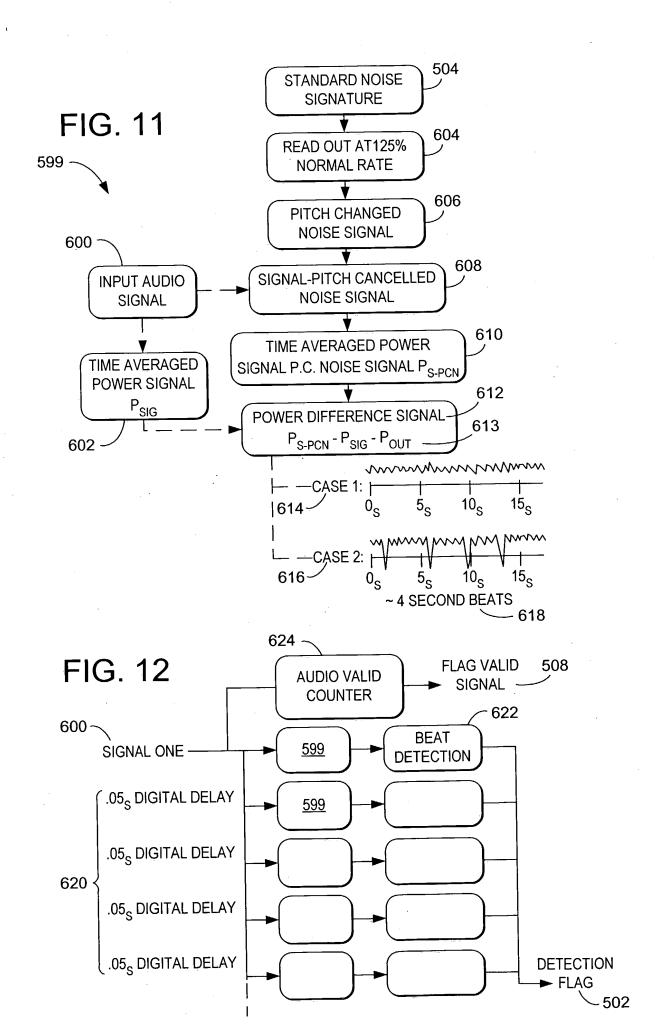
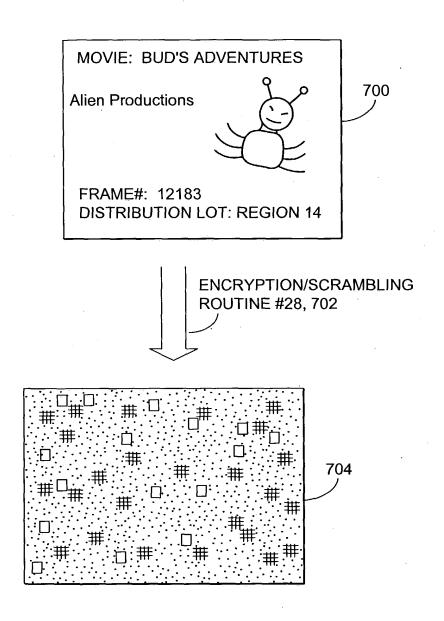


FIG. 10

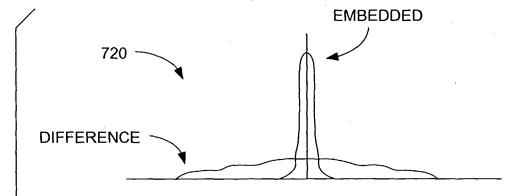




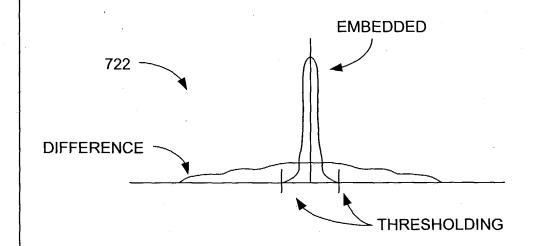


PSEUDO-RANDOM MASTER SNOWY IMAGE (SCALED DOWN AND ADDED TO FRAME 12183)

FIG. 13



MEAN-REMOVED HISTOGRAMS OF DIFFERENCE SIGNAL AND KNOWN EMBEDDED CODE SIGNAL



MEAN-REMOVED HISTOGRAMS OF FIRST DERIVATIVES (OR SCALER GRADIENTS IN CASE OF AN IMAGE)

FIG. 14

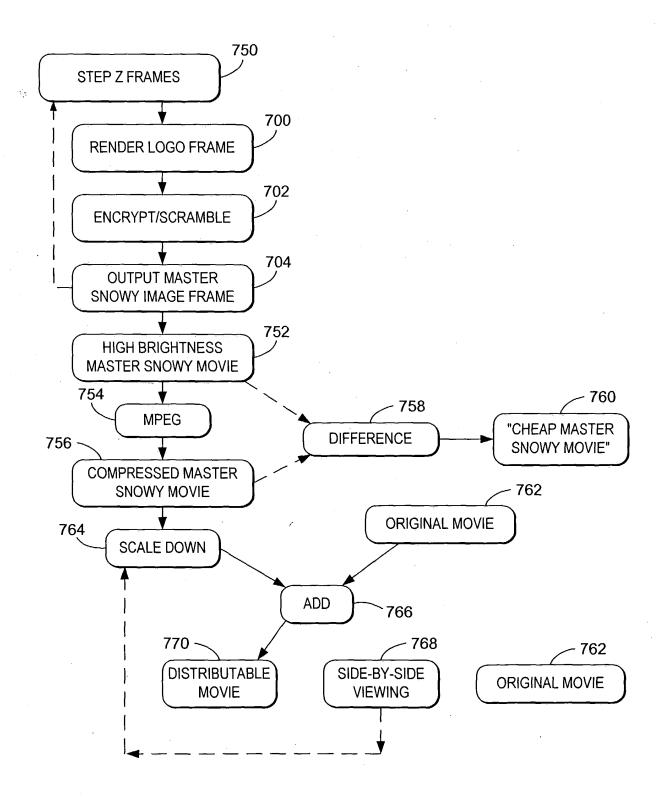


FIG. 15

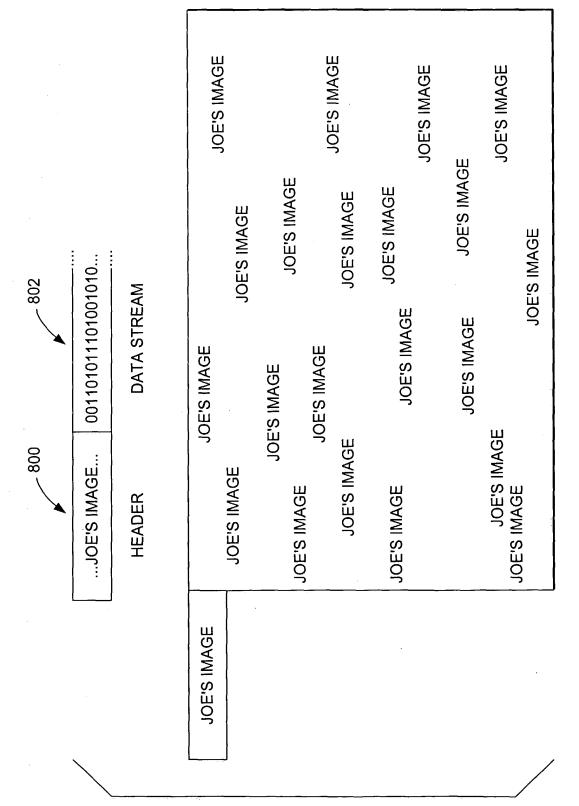
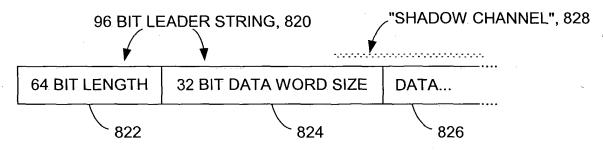


FIG. 16



UNIVERSAL EMPIRICAL DATA FORMAT

FIG. 17

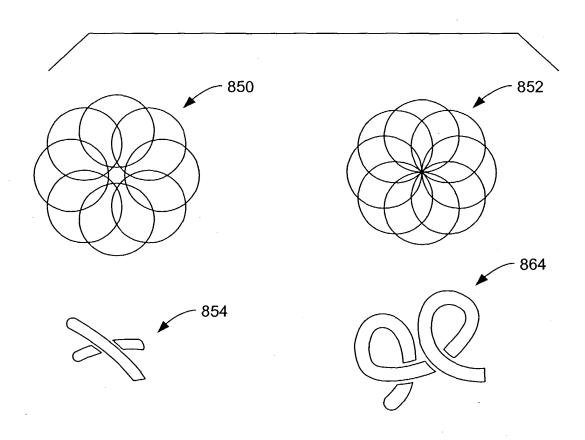
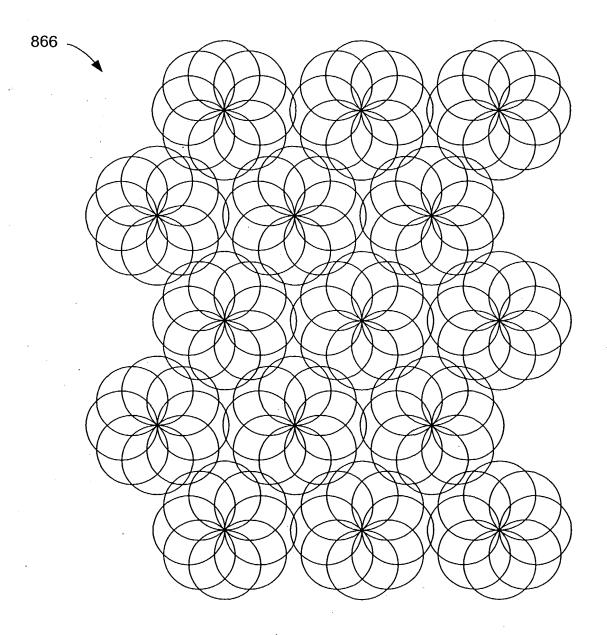
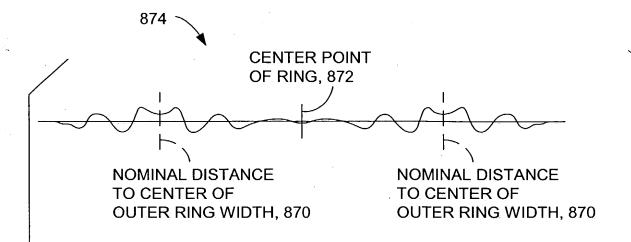


FIG. 18



QUEST FOR MOSAICED KNOT PATTERNS WHICH "COVER" AND ARE COEXTENSIVE WITH ORIGINAL IMAGE; ALL ELEMENTAL KNOT PATTERNS CAN CONVEY THE SAME INFORMATION, SUCH AS A SIGNATURE, OR EACH CAN CONVEY A NEW MESSAGE IN A STEGANOGAPHIC SENSE



2-D BRIGHTNESS OF PHASE-ONLY FILTERED RING IS SIMILAR TO THE ABOVE BRIGHTNESS PATTERN ROTATED ABOUT CENTRAL POINT OF RING:

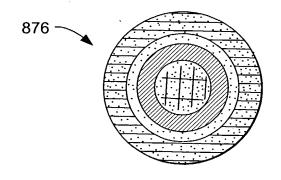


FIG. 20

900 C 2C C

2C 4C 2C

C 2C C

WHERE C = 1/16

ELEMENTARY BUMP (DEFINED GROUPING OF PIXELS WITH WEIGHT VALUES)

FIG. 21A

					·									<u>.</u>
	2		3		4		5		6		7		0	
	6		7		0		1		2		3		4	
· • • • • • • • • • • • • • • • • • • •						С	2C	С			i .			
	2	, -	3		4	2C	4C	2C	6		7		0	
						С	2C	С					-	
	6		7		0		1		2		3		4	]
	:	:	:	:	:	:	:	:	:	:	:	:	:	:

EXAMPLE OF HOW MANY ELEMENTARY BUMPS, 900, WOULD BE ASSIGNED LOCATIONS IN AN IMAGE, AND THOSE LOCATIONS WOULD BE ASSOCIATED WITH A CORRESPONDING BIT PLANE IN THE N-BIT WORD, HERE TAKEN AS N=8 WITH INDEXES OF 0-7. ONE LOCATION, ASSOCIATED WITH BIT PLANE "5", HAS THE OVERLAY OF THE BUMP PROFILE DEPICTED.

FIG. 21B

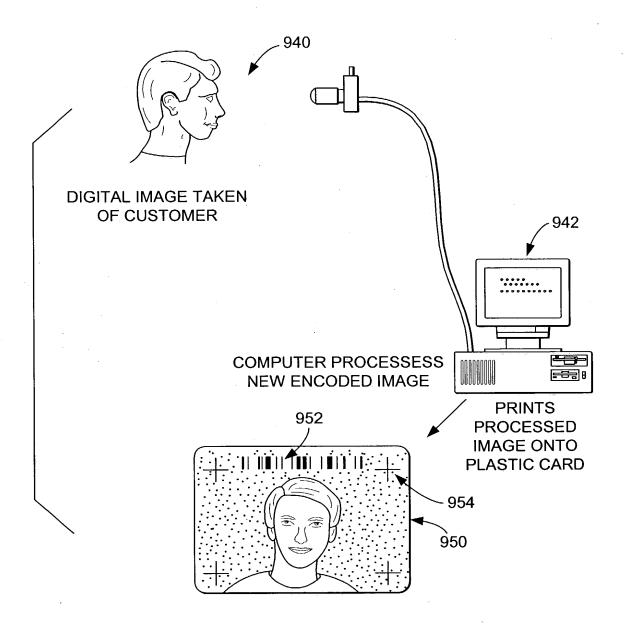
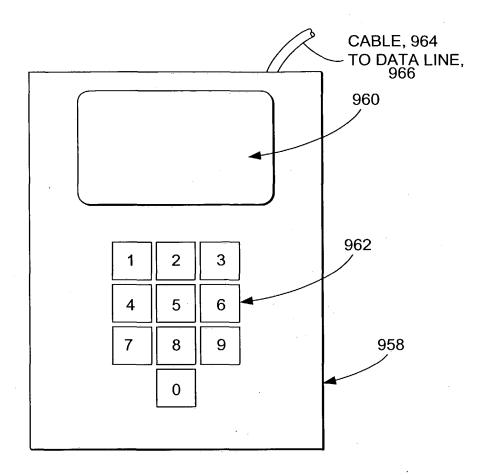
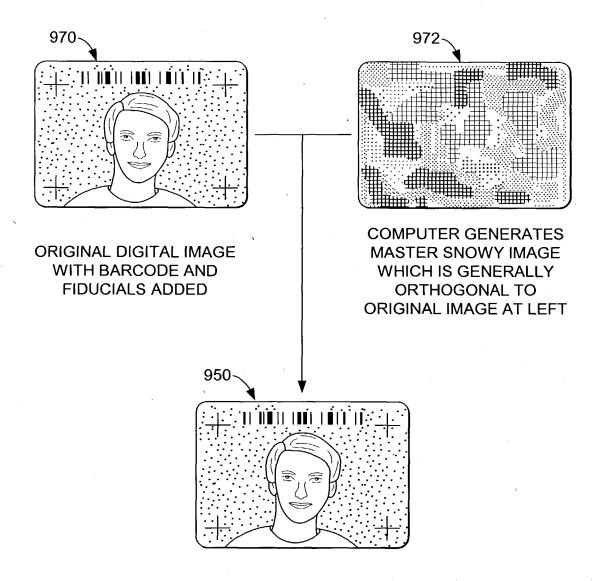


FIG. 22



CONTAINS RUDIMENTARY OPTICAL SCANNER, MEMORY BUFFERS, COMMUNICATIONS DEVICES, AND MICROPROCESSOR

CONSUMER MERELY PLACES CARD INTO WINDOW AND CAN, AT THEIR PREARRANGED OPTION, EITHER TYPE IN A PERSONAL IDENTIFICATION NUMBER (PIN, FOR ADDED SECURITY) OR NOT. THE TRANSACTION IS APPROVED OR DISAPPROVED WITHIN SECONDS.



COMBINED TO FORM PERSONAL CASH CARD

FIG. 24

# TYPICAL TRANSACTION STEPS

READER SCANS IMAGE ON CARD, STORES IN MEMORY, EXTRACTS PERSON'S ID OPTIONAL: USER KEYS IN PIN NUMBER

READER CALLS CENTRAL ACCOUNT DATA NETWORK, HANDSHAKES

READER SENDS ID, (PIN), MERCHANT INFORMATION, AND REQUESTED

RANSACTION AMOUNT TO CENTRAL NETWORK

CENTRAL NETWORK VERIFIES ID, PIN, MERCHANT INFO, AND ACCOUNT BALANCE

IF OK, CENTRAL NETWORK GENERATES TWENTY-FOUR SETS OF SIXTEEN DISTINCT RANDOM NUMBERS, WHERE THE RANDOM NUMBERS ARE INDEXES TO A SET OF တ် ည

64K ORTHOGONAL SPATIAL PATTERNS

CENTRAL NETWORK TRANSMITS FIRST OK, AND THE SETS OF RANDOM NUMBERS

READER STEPS THROUGH THE TWENTY-FOUR SETS

ထ

READER ADDS TOGETHER SET OF ORTHOGONAL PATTERNS

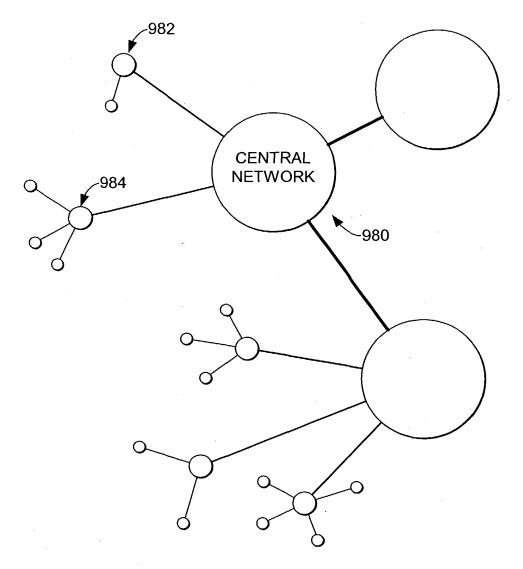
READER TRANSMITS THE TWENTY-FOUR DOT PRODUCT RESULTS TO CENTRAL NETWORK READER PERFORMS DOT PRODUCT OF RESULTANT PATTERN AND CARD SCAN, STORES RESULT

CENTRAL NETWORK CHECKS RESULTS AGAINST MASTER

CENTRAL NETWORK SENDS FINAL APPROVAL OR DENIAL

CENTRAL NETWORK DEBITS MERCHANT ACCOUNT, CREDITS CARD ACCOUNT

### THE NEGLIGIBLE-FRAUD CASH CARD SYSTEM



A BASIC FOUNDATION OF THE CASH CARD SYSTEM IS A 24-HOUR INFORMATION NETWORK, WHERE BOTH THE STATIONS WHICH CREATE THE PPHYSICAL CASH CARDS, 950, AND THE POINT-OF-SALES, 984, ARE ALL HOOKED UP TO THE SAME NETWORK CONTINUOUSLY

